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MONTHLY REVIEW

Published by the

American Electro-Platers Society

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SCIENCE OF ELECTRO-PLATING

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RUST

If anything is not used it is rusted. It is true of all parts of both soul and body that what is not properly exercised atrophies. If you do not exert your muscles they devour their own strength. So also the mind that does not continually study and learn does not remain blank, but fills up with a vast mass of untruths which destroy it. Ignorance is the rust of the mind, It is fully as hard on the system to have nothing to do as to be overworked; worse, indeed, to rust out than to wear out.—Dr. Crane.

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American Electro-Platers' Society

Editors' Office, 4156 Botanical Ave., St. Louis, Mo.

Vol. 7 DECEMBER No. 13

TORONTO NUMBER

Branch Society numbers of the Monthly Review are now in order, and it is a pleasure to begin this feature by having in hand Toronto Number. We believe the efforts put forth in securing material for a branch number is beneficial to the individual who contributes, and to the branch as well as to the entire society. We congratulate Toronto branch on the result of their effort and thank the (committee) for his work.

This issue closes our work for the year 1920, and we want to express our appreciation to everyone who has contributed their part in material for our publication, whether it has been a paper, report of meetings, announcements or poems; it is all evidence of loyalty, and as we step over the line to 1921, may the same spirit continue, and may we endeavor to make more progress in our society.

I am glad to announce a Bridgeport Number for January, and to wish you all a Happy New Year.—Editor.

Waterbury, Conn., December 16, 1920.

Dear Mr. Editor:—

I again have the honor to notify you that Connecticut has another branch society. One was organized in Waterbury, December 14, 1920, with an initial membership of 31, and by the January meeting, at which the officers will be elected, more members will be enrolled.

The circular letter and newspaper report of the meeting is enclosed.

Yours truly,

GEORGE B. HOGABOOM.

BETTER PLATING EQUIPMENT

By John Acheson, Toronto Branch

If a history of the plating industry were being written, it would require no stretch of the imagination to prove that its period of greatest progress has been within the past ten years; most of which has been due to the efforts put forth by the progressive electro-platers through the co-operation made possible by being bonded together within an educational society, through which we have learned to dig deep into those things which at one time in the lives of most of us appeared dark and mysterious. While education and co-operation between ourselves, as well as the assistance rendered us by our friends, have resulted in a marked improvement in our methods, we have yet a long way to go before we will have attained perfection.

While it is undoubtedly the aim of every plater to develop a better solution or method, thereby improving the product or reducing the cost, it is noticeable in most of the various papers and articles, read before our members or published in the Review. that our attention is usually drawn in the direction of such improvements in the composition of the various solutions as should result in one or the other of those objects. The result has been, in my opinion, that the plater of today is concentrating to such an extent on the chemical end of the business, that he quite frequently loses sight of the electrical and mechanical end, which is of no less importance.

There are many plants throughout the country today operating modern solutions, but with equipment that is very ancient, badly designed and incomplete. Quite frequently we will find the dynamo too small to properly take care of the quantities of work being plated; conductors and tank wires too small and improperly connected at the joints, which results in heating and loss of current; old-fashioned rheostats that have no more control over the current than they have over the profanity of our helper when he burns his fingers in attempting to operate them; no electrical instruments whatever, other than perhaps a voltmeter, which may be found away over in a dark corner near the dynamo. We will see uninsulated steam coils connected to tanks; improperly insulated cathode and anode rods laying on damp tank edges, which result in current loss; also uncovered fouled anode rods that are the cause of poor anode efficiency. We will find steam coils too small, improperly placed in the tank, or the steam supply limited, which results in lower efficiency; drainage improperly designed or too small, which is frequently the cause of overflowing tanks and flooded floors, which usually result in a visit from our friends on the floor below. These, as well as many other deficiencies that I might mention, all tend to react against such progress as we may have attained in the chemical end of the industry. I am sure, though, that the plating room does not exist that possesses all the shortcomings enumer-

ated—it couldn't; although one or more of them is typical of many of the plants throughout the country, and some of them considered modern ones, too.

In attempting to enumerate the various electrical and mechanical features that might be included as parts of a complete and properly equipped plating unit, I might write at considerable length and detail. For the present, however, I deal briefly with what I would consider some of the essential and most necessary parts of the equipment.

First and most important is the dynamo, which should be of such a type as will maintain its full voltage under any load, direct motor-driven preferred, with field rheostat control. In size it should be large enough to take care of all tanks, with which it is connected, when loaded to their capacity. Main conductors and tank leads should be of ample capacity to carry the maximum amount of current, and properly proportioned. All joints should be soldered where practicable; otherwise they should be of the split or clamped variety, drawn sufficiently tight to give a good bearing. Where joints are not soldered it is advisable to cover them with friction tape and paint with asphaltum paint, in order to prevent corrosion.

Rheostats should be large enough to permit delivery of the maximum quantity of current that may be required in the tank with which it is connected. They should be of such a type as will permit regulation from a few amperes, or even fraction of an ampere, up to the capacity of the instrument.

No plating room is complete without a voltmeter and ammeter, connected to each plating tank. If the plater cannot have both, but has a choice of either, by all means choose the ammeter. Space does not permit me at this time to elaborate upon the advantages to be gained by the intelligent use of these instruments. It may be sufficient to say, though, that the plater who has learned to operate his various solutions with the aid of the voltmeter and ammeter is a master of his profession, and not a slave to it.

Wherever practicable, all steam pipes should be covered to prevent loss of heat by radiation; where they enter and leave tanks which are connected up electrically they should be provided with insulators. Steam coils in cleaning tanks should be large enough to permit quick heating of the solution, and so placed as to cause a vigorous agitation when required, and at the same time throw the scum away from the working side of the tank.

Anode, as well as cathode rods, should be kept clean, so as to provide as perfect electrical connection with the anodes as possible. Where practicable, they should be provided with a suitable covering of wood or other material in order to prevent fouling by solution drip.

We have been taught to realize that cleanliness and order are essential to the success of modern industry, and in this

respect I do not know of any case where the rule could be applied with greater effect than in ours—regular and systematic cleaning should be the rule in every plating room, and should include every piece of equipment from the dynamo down.

The mechanical field in the plating industry is, indeed, a large one, in which there is yet plenty of room for improvements that should go to keep pace with the advances we have already made in the chemical field.

OXIDIZING OF COPPER AFTER PLATING.

By F. J. Stankard, Toronto Branch.

This subject, to the writer's opinion, is the one that the manufacturer depends upon to sell his goods. An article that is not finished properly will not be pleasing to the eye, and will not sell. The manufacturer that has a finishing department attached to his plating room wants his goods when put on the market to look as good, if not better, than his competitors' and it is human nature for platers in this branch of the business to want the same.

Oxidized copper, when finished properly, is very pleasing to the eye, and I will explain the method I am using, which I hope will interest the members of the Toronto branch. In my line of business, which is the plating and finishing of builders' hardware, we have a large proportion of steel inside sets that have to be plated, oxidized and releived.

After the work is copper plated, I do not have it dry scratch brushed except when it is ornamental work, and this is scratch brushed. The plain work I scour with sand taken from the blower of my sand blast machine. This fine sand is as good as ground pumice stone. It can be mixed with pumice stone in the proportion of half sand and half pumice stone if the platers see fit to have it. This method saves the cost of scratch brushing as well as the price of pumice stone. If you stop a moment and consider, this will amount to some saving in a year's time.

It also leaves the work to be oxidized with a semi-bright finish, whereas pumice stone will leave it dead. This fine sand can be used over and over again for scouring.

My next operation is the oxidizing, which the writer thinks is the principal part. If it is oxidized poorly the releiver, when he puts the buff wheel on it, will no doubt have it ragged. I have the operator oxidize it to a near black, dried in hot water, hand brushed and then on a worn down steel wheel to get a bright black finish. From this operation it goes to the releiver and when buffed it will surely blend and the oxidize will not break and be ragged.

In Italy they have decided to seize all the profiteers' money. In this country the profiteers have decided to seize all of ours.

ELECTRO DEPOSITION OF COPPER IN THE MAKING OF COPPER MATRICES

By John A. Magill, Toronto Branch

In view of the fact that in the April and May issue of the Monthly Review, we find published therein a comprehensive report on the preliminary operations necessary in preparing the work (MOTHERS) for the final deposit in the Acid Copper bath, it will not be necessary for me to elaborate on that subject, inasmuch as the methods I pursue are similar to those mentioned by Royal F. Clark in his interesting contribution. I will therefore confine my remarks to the making of the matrix shell, and also add a few comments on the action of the Acid Copper bath in general. Firstly, let us consider that whereas heat and agitation increase chemical action, it naturally follows that these two factors are of great value in electro deposition, but they are limited according to the composition of the bath in which they are employed, and also to class or shape of the articles. In an Acid Copper solution, where high current densities are used, it becomes a question of controlling the temperature instead of raising it. Although not having to contend with this latter condition in my baths, which contain 225 gallons each, with a cathode area of approximately nine square feet and a current density of 65 Amp. per sq. ft., the temperature of the solution never rises above 90 degrees Fah., the baths being worked 14 hours per day, with the exception of 1 hour required for changing the bath at the end of a nine-hour run. During the first hour a current density of approximately 12 Amp. per sq. ft. is used, after which the amperage is increased to the higher limit for eight hours. When the shells have been stripped off and trimmed to their standard size, 10-inch diameter, they show a thickness of .025 to .027. The foregoing is the average daily working condition of the baths. After taking up the subject of agitation, I will again refer to changes in temperature with higher current densities.

Agitation. The greater the agitation in an Acid Copper bath, where heavy and smooth deposits are required, the better, air agitation being used in the majority of cases, due mostly to the irregularity in the shape of the articles to be plated, but, where permissible, mechanical agitation is superior, inasmuch as it allows for a greater agitation, which is desirable, and also does away with the disagreeable vaporization and consequent corrosion of rods and connections. The matrix for graphophone records being of a suitable design for mechanical agitation, it is much preferable that this method should be adopted. An oscillating motion is used with a 10-inch stroke—60 strokes per minute—50 ft. agitation per minute. Although I use a current density of 65 amperes per sq. ft., which is the limit of the current at my disposal, it is possible, however, to use a higher current density with the agitation I have previously mentioned, as the following experiment will show. Having a 2000 Amp. generator available,

I decided to produce in five hours matrices that under ordinary working conditions required nine hours deposit to secure the desired thickness of .025. Analysis of the solution showed 7.5 oz. metallic copper and 5 oz. av. free sulphuric acid, per gallon. The following data explains changes taking place in rise of temperature and consequent increase in current density, due to decreasing resistance, the voltage being constant. As stated before, a current density of approximately 12 Amp. per sq. ft. is used for the first hour, but in this experiment I used the lower current for the first half hour only, without agitation.

Time	Amperes	Volts	Temp.	Cathode Area
10:45 to 11:15	100	.7	88 Fah.	9 sq. ft.
11:15 ....increased C D to.....	750	4.75	88 Fah.	9 sq. ft.
11:45	850	4.75	96 Fah.	?
12:45	950	4.75	104 Fah.	?
2:15	1060	4.75	*113 Fah.	?
3:45	1110	4.75	117 Fah.	?

*At 2:15 I placed a 12-inch electric fan over the solution to control the temperature which naturally limited the increase in current density proportionately. These matrix shells, when trimmed to their standard size, showed a thickness of .025, the deposit being smooth and malleable.

Filtration. I use a centrifugal pump for this purpose, my tanks being placed in series of three. In No. 1 tank an overflow feeds into the bottom of No. 2 tank and continues likewise through the other tanks into the filtering tank, which contains a felt filter bag, and from there the solution is pumped back to the bottom of No. 1 tank, the solutions being filtered several times a day.

Colloids and Reducing Agents. A few years ago I carried on some laboratory experiments with several additions to copper sulphate baths, and the following are the materials used and nature of the deposit secured:

Glue, good brightener; molasses, smooth and clear; ethyl alcohol, fair; oxy muriate of tin, smooth and clear; tannic acid, poor; sugar, extra good. With this latter material I used 1½ lbs. per gallon, the deposit having an appearance similar to the deposit from a hot copper cyanide bath. Although these various materials have their merits in acid copper baths used for ordinary deposits, I think it is not necessary to use them where heavy deposits are required, as the physical properties of the copper deposit will be governed by the current density used in its relationship to the metallic and acid strength of the solution, its temperature and speed of agitation. The greater the acidity to certain limits the softer the deposit.

COLLOIDS

By Thomas O'Keefe, Toronto Branch

As colloids are now being used extensively in electro-plating, it occurred to the writer that a little information about them might prove of interest. He has, therefore, gathered together the following points from the notes taken down while attending the class in electro-plating at the Central Technical School, Toronto.

Colloid is a jelly-like material, when added to water forms what appears to be a solution, but what turns out to be entirely different from a true solution.

In the case of a true solution, the material dissolved will pass through an animal membrane, such as a pig's bladder.

In the case of the so-called colloidal solution, the colloid will not pass through the animal membrane. Upon evaporation, the solid in a true solution is deposited in a crystalline form, while colloids will not crystallize.

By means of the ultra-microscope, it has been shown that solid particles actually exist in a colloidal solution. But the presence of solid particle in a true solution has never been proven.

These solid particles in the colloidal solution are so very small that they will pass readily through the pores of a filter paper. Measurements made by the ultra-microscope show these particles vary in size from about one-quarter of a millionth of an inch in diameter, to particles one-tenth of that size.

The solid particles in colloidal solutions bear electric charges and even as some ions are positively charged and some negatively charged, so we find some colloids in solution positively charged and some negatively charged.

Colloids such as gelatine and glucose bear positive charges, and, under the influence of the electric current, move slowly towards the cathode.

Other colloids, such as those of silver and gold, are negatively charged and move towards the anode.

This behavior of colloidal gold and silver is interesting when we recollect that gold and silver ions bear positive charges and more to the cathode.

FINISH FOR ART METAL GOODS

By J. Payne, Toronto Branch

A very pleasing finish, a greenish russet bronze color, suitable for chandeliers, desk sets and art metal goods generally, can be obtained by the following method, in articles of brass or brass plated.

After cutting down with tripoli, wash, and brush wet with powdered pumice as for brushed brass. Rewash and immerse in the following solution, which should be heated to nearly boiling in a wooden tub or earthenware crock, using live steam. Eight oz. hyposulphite of soda dissolved in 1 gal. water and

sufficient nitric acid added to turn to a rich cream color. Usually ¼ oz. to the gallon will do this. Upon immersion in this solution an Old Gold shade is produced, which is quickly followed by reddish and purple shades and then a greenish sheen. When work reaches this stage, take out and rinse and then scratch brush on a fine brass wire wheel, using a weak soda solution to brush with. This brings out the true color, which is a rich russet brown, if the foregoing operations have been properly carried out.

Finish does not fade, but must be lacquered with a good lacquer.

The above solution can also be used in conjunction with a liver of sulphur oxidizing solution made up of ⅛ of an ounce sulphuret of potash to a gallon of warm water.

If work is alternately immersed and rinsed in first the Hypo solution and then the sulphuret of potash solution, various colorings are obtained which are all more or less useful in producing attractive finishes for Art Metal goods, etc.

NICKEL ELECTROTYPE SOLUTION.

Nickel Sulphate	2 lbs.
Magnesium Sulphate	1 lb.
Water	1 gallon

Acidulate slightly with acetic acid. After securing desired thickness of nickel, back up with copper in acid copper bath. —Toronto Branch.

REMOVAL OF IRON SCALE.

Where it is desirable to remove scale off steel parts without corroding the metal, the following solution has been used with success: Sodium cyanide, 1½ lbs; water, 1 gallon. When the work has been freed from grease and oils, place in the above solution. Throw in some metallic zinc and heat solution to 200 degrees Fahrenheit. To expedite matters, the work may be scratch brushed with pumice stone and water as soon as the scale softens. This method may be tried out in a small way by using a galvanized iron pail as a container for the solution. A good source of ventilation is required.—Librarian, Toronto Branch.

THEY SAY:

That old maids rush in where widows fear to tread.

That being honest because "honesty is the best policy" is rank dishonesty. Think it over.

That to lift another up you must be on higher ground yourself.

That haste to get rich keeps many men poor.

That fast friends are all right only they shouldn't be too blamed fast.

Extracts from an Experimenter's Note Book.

W. S. B., Toronto Branch.

BLACK DEPOSITS.

After noting the darkening effect which small additions of Ammonium Molybdate to a nickel bath had upon the deposit, the following tests were made to ascertain the effect of appreciable quantities of the former in a nickel solution:

To 1 gallon (Imperial) of nickel solution containing

Nickel Sulphate	907.2 grains
Magnesium Sulphate	142. grains
Boric Acid	113.6 grains

which had a faintly acid reaction, 120 c. c. of Ammonium Molybdate was added. Cathode during entire test consisted of copper, 2 square inch surface area.

.3 ampere, 5 volts—Deposit, black, soft, easily removed.

120 c. c. Ammonium Molybdate added:

.3 ampere, 5 volts—Deposit, black, soft, more adherent.

120 c. c. Ammonium Molybdate added:

.38 ampere, 5 volts—Deposit, black, with iridescent colors; harder than previous plates.

120 c. c. Ammonium Molybdate added:

.5 ampere, 5 volts—Deposit of 5 minutes' duration; black, hard, buffed to high luster. Difficult to remove as compared to previous coatings.

120 c. c. Ammonium Molybdate added:

.55 ampere, 5 volts—Deposit of 30 minutes' duration; very hard; withstood scouring with pumice. Colored beautifully—brilliant black—adherent and smooth.

Current reduced to .15 ampere, 4.5 volts—Deposit, grey, hard, buffed to good luster; smoot and adherent.

Acidity increased slightly by addition of 120 c. c. Molybdic acid.

.5 ampere, 4.5 volts—Deposits of 5 minutes' duration were hard, buffed easily to high luster.

Believing the coatings obtained would prove of value, several samples were lacquered and remained perfect during several months' exposure to atmosphere and to use on office desk.

NON-TARNISHING DEPOSITS.

426 grams chromium sulphate dissolved in 1000 c. c. water. Solution dense green. No sediment or crystals apparent after 48 hours. Anodes-chromium.

18 amperes per square foot at 6 volts gave grey-white deposit which was easily removed.

31 amperes per square foot, 5.25 volts—Deposit, dark grey, brittle; cracked when bent. Added 60 c. c. strong boric acid solution; temperature of bath, 41 degrees C.

144 amperes per square foot, 10 volts—Deposit of 5 minutes; hard, somewhat brittle, buffed easily; cracked when bent.

Acidity neutralized with $NaCO_3$. Lower C. D. yielded no deposits.

165 amperes per square foot, 10 volts—Deposit, splendid, smooth, adherent, buffed easily; did not crack when bent; time, 10 minutes.

Color of above deposits resembled buffed aluminum. Tests made with these deposits and electric heat equal to temperatures ordinarily used on household utensils failed to discolor the deposits appreciably. Nickel deposits subjected to same tests at same time were nearly black at conclusion of tests.

HEAVY BRASS DEPOSITS.

Cu. C. N.	4 oz.
K. O. H. (white stick)	3 oz.
K. C. N.	8 oz.
Zn. (C. N.) 2	2 oz.
H_20	1 gallon

Add the Zn. (C. N.) 2 until the desired color is obtained.

This solution has been in use 12 years and 24-hour deposits are obtained without blistering. Small additions of cyanide and caustic potash have been added as conditions warranted, but no metal has been added since solution was first made up. Narrow anodes are preferable to obtain good working conditions in a brass solution. It is also necessary to keep the anodes clean and soluble. Cyanide having a greater affinity for copper than zinc, it will be noticed that as the free cyanide content of the bath diminishes, the greater becomes the formation of zinc oxide upon the anodes, which causes insulation. Under these conditions we begin to rob the bath of metal and it is here we notice the greater affinity of cyanide for copper in the production of redder deposits. It is this condition that leads the inexperienced plater to believe his solution requires an addition of zinc to bring about the desired yellow brass color. It becomes obvious that when the solution is made up in proper proportions to give the desired color, it is necessary that we pay more attention to the condition of the anodes. Zinc oxide not being readily soluble in cyanide, we must add a material to our solution which will bring about the formation of a zinc compound at the anodes, which is readily soluble in free cyanide. Zinc chloride and zinc hydroxide being readily soluble, we must add materials to our solution to bring about their formation. Ammonium chloride, ammonium hydroxide, potassium hydroxide or sodium hydroxide are suitable materials.—Librarian, Toronto Branch.

SUCCESSFUL METHODS

1. Is gold plating practical on die castings containing zinc? If so, what is the best method to use?

Ans. Nickel plate part first, then flash in either copper or brass and then plate in gold.

2. How does the conductivity in a solution effect its efficiency in depositing?

Ans. In an alkali solution the efficiency is lowered, but in an acid solution it has a tendency to increase the efficiency.

3. What is meant by anode and cathode current and solution efficiency?

Ans. Cathode and current efficiency—Percentage of metal deposited in a given number of ampere hours calculated according to Faraday's law. Solution efficiency—Certain number of grams deposited for a certain number of ampere hours and calculated according to Faraday's law. Anode efficiency is calculated by amount of metal taken out of the solution and amount of metal restored to the solution by the anode.

4. How full can an Abbott ball burnishing barrel be loaded for burnishing small brass and steel pieces?

Ans. About ¾ full of work and balls, and then fill within about 2 inches of the top with water.

5. What is a good non-conducting ball for plating and burnishing at one operation in mechanical plater?

Ans. Agate balls as used in Germany before the war was one suggestion. African pebbles obtained from the deserts was another, and silcon or duro iron balls was another. We think each have merit, but practice will determine the best.

6. What are the advantages or disadvantages of agitating a silver solution with air or an oscillating device on the cathode rod?

Ans. Oscillating motion is the best in a silver solution, as air brings to the surface of the solution the small parts of chloride, causing a rough deposit, and the oscillating motion increases the working efficiency of the tank.

7. When a brass solution does not feed or plate from the anode, what is the cause?

Ans. It was decided in this case it was lack of cyanide.

8. What is the best way to black nickel, steel and die castings assembled in one piece, and the steel is pretty rusty?

Ans. Electrically pickle, using reverse current in sulphuric acid about 55% beaume. This would remove the rust from the

steel without injuring the die castings. Then nickel-plate in the regular way, and then in black nickel plate.

9. This one came in the tenth hour and we ask you, Mr. Editor, to start something in your Review by asking the "boys" all over this big land the following question: What is the cause of copper, brass and gold being absorbed by die castings made of zinc?—Chicago Branch.

Financial statement of the eighth annual convention, held June 30-July 1, 2, 3, 1920, at Rochester, N. Y.:

Souvenir program receipts	$1,658.00	Printing program	624.43
Registration fees	1,481.00	N. Y. S. Railway	9.72
Exhibits	85.00	Ladies' committee	30.00
Total receipts	$3,224.00	Ladies' lunch	75.00
Total expenses	2,928.85	B. R. P. tickets	378.00
		Lunches on boat	264.00
		Music on boat	40.00
		Music at banquet	70.00
		Entertainers at banquet	35.00
		B. R. P. boat tickets	101.39
		American Taxicab Co.	59.00
		Pendants	20.00
		Autos	52.67
		Seneca Hotel	860.60
		Metal Arts Co.	147.92
		Printing Menu	30.75
		L. C. Smith & Bros.	60.00
		Committee to Coburg	10.00
		Exhibit committee	12.49
		Program postage	25.00
		Auto gas, oil and tips	17.88
		John Burk, refund on check	5.00
Cash balance	$ 295.15	Total expenses	$2,928.85

Auditing Committee.

J. A. MICHELS,
E. TROXLER,
C. A. REAMA,
C. L. PUFFER,
E. E. FITCH,

WHAT THE BRANCHES ARE DOING

Toronto.

Meets second Thursday of each month at Occident Hall, Bathhurst and Queen Streets. Secretary, Chas. Kemish, 271 Boston Avenue, Toronto, Ont.

Our November meeting was presided over by President Thomas O'Keefe. One application for active membership and one reinstatement was received. Three candidates were elected to active membership. Communications and bills were received and dealt with. The balance of the evening was taken up by the reading of papers. Mr. Acheson, who was appointed a committee of one to gather this material, met with considerable success along this line and deserves the credit due him, as will be seen by the following: The first paper was read by Mr. Joseph Payne on "How to Obtain a Green Russet Bronze Finish."

Second—"The Oxidizing of Copper," by Mr. Stankard.

Third—"Efficiency in the Plating Room," by Mr. John Acheson.

Fourth—"Colloids," by Mr. Thomas O'Keefe.

Fifth—"Duplex Copper Plating," by Mr. John Magill.

These papers were well received and great interest was taken in them by the members present. Mr. Acheson was tendered a vote of thanks. We will forward them on to be published in The Review, and hope other members will derive some benefit from them.

The December meeting of Toronto Branch was well attended and was presided over by President Thomas O'Keefe. Five applications were received.

We had hoped to have had the platers' class in full swing this fall, but were sadly disappointed in that we were unable to have an instructor owing to a shortage in this line, but we have an applicant for associate membership who we are assured is thoroughly competent to fill the gap if it is at all possible to come to some arrangement with the Board of Education. Toronto Branch will be proud of counting among its membership one who is so highly capable of instruction, in the person of Mr. Frank H. Thiers, whose willingness has been accepted. Mr. Magill and Mr. O'Keefe, as a committee, were appointed to interview the principal of the Toronto Technical School to pave a way for Mr. Thiers.

Mr. Acheson reported that he had received another paper to be added to the December issue of the Review, which will be the "Toronto Number," which the members are anxiously waiting to receive.

We had the pleasure of having with us Mr. William Salmon, who has been very energetic in Montreal, being instrumental in organizing the Montreal Branch, being ably assisted by some of the present members of that branch. The remarks, regarding the personnel of Montreal Branch, convinced us that they were endowed with brains and were quite able to use them. Here's hoping they will be using up some space in the Review soon.

Wishing each and every member a Merry Christmas and a Happy New Year.

Boston.

Meets first and third Fridays of each month, 8 p. m., at the Quincy House. Secretary, A. W. Garrett, 37 Dorset St., Dorchester, Mass.

Boston Branch met Friday, November 19, 1920, at 8 p. m., with President Mackie in the chair. Two new members were elected, Mr. Philip Nelson and Mr. Franklin W. Hobbs. Report of the banquet committee was made and things look very good. The branch should make the first banquet a great success. The members then had a discussion of nickel and copper solutions for use in barrel plating, most of the members getting into the discussion. The vote of the branch on the assistant foreman amendment to the constitution was as follows: For the proposition, 14, and against the proposition, 2. This vote was taken by ballot. A motion was made that the secretary be instructed to write to the secretary-treasurer of the supreme body, stating that our temporary charter is now closed and that we are ready for a permanent charter.

Boston branch had another interesting meeting Friday evening. One application for membership was received. Report of the banquet committee was made and the committee is working hard to make our banquet a success. We had with us Mr. Philip Sievering, of New York, who spoke of the work being done by the society, and gave the members an invitation to visit him any time that they might be in New York. A discussion on the sulphate of zinc solution was interesting. The next subject will be "Why the Anode Coat in the Zinc Solution?"

Bridgeport.

Meets third Friday of each month in its laboratory, 260 John St., Bridgeport, Conn. Secretary, Louis J. Maraffi, 744 Hancock Ave., Bridgeport, Conn.

Our November, 1920, meeting was held in the laboratory, with 18 members present. One application was read and passed over to the board of managers.

We had as guests Mr. Donnely, of the Yale & Towne Co., and Mr. Rice, of the Apothecaries-Hall Co. Mr. Donnely spoke of his work done in the Y. & T. Co. and Mr. Rice gave a short talk on nickel anodes.

Mr. Hopkins told of an experience in nickel-plating some steel parts, which came out of the tank very rough, while other work done in the same tank was all right. He found that some of the parts were magnetized and when put in the nickel tank had attracted iron particles in the bath, causing them to come out very rough. He had them demagnetized and they came out O. K.

The offer made through Mr. Slattery of Mr. Bissell, chemist and president of the Bissell Varnish Co., to give us a talk on japans and enamels after the first of the year was thankfully accepted.

Chicago.

Meets second Saturday of each month, 8 p. m., at the Briggs House, Randolph and Wells Sts., Secretary, Frank J. Hanlon. 2855 N. Richmond St., Chicago, Ill.

Meeting of December 11 opened with President Thornton presiding. One applicant was elected to membership.

The banquet committee reported that they had decided to hold the ninth annual banquet at the University Club, Michigan Avenue and Monroe Street, on the 29th of January, 1921, and that they expect to have many prominent speakers present; also that the price per plate would be $3. The announcements will be out soon.

The library committee reported that they had received some additional books for the new library.

We had the pleasure of having Mr. Proctor, Mr. Eichstadt and Mr. Musgrave, the latter of the Toledo branch, with us at one time, and enjoyed seeing them.

Mr. Musgrave stated that he was now at Waukegan, Ill., and would be with us often and get in on some of the discussions.

The librarian had several questions in the dope box and the way the boys snarled at them it tickled the heart of dad. (See "Successful Methods.")

Cleveland.

The Cleveland Branch meets every second and last Saturday of the month at 1344 East Prospect St. Secretary B. F. McCormick, 1941 West 77th St.

Our meetings are not being attended as they should be, but we look for both better attendance and more interesting meetings. One application for membership has been received.

Our librarian, Mr. Finn, having left the city, sent in his resignation, which, of necessity, was accepted.

Mr. J. C. Singler was elected librarian and he immediately demanded from three members that they each present a paper at the next meeting, so it would be well for the "stay at homes" to turn over a leaf and with a New Year's resolution support the meetings of our branch.

Cincinnati.

Meets on the first and third Friday of each month at Dennison Hotel. Secretary, W. J. Husing, 729 McMakin Ave., Cincinnati, O.

At our last meeting one application for membership was received and referred to our board of managers. We are having something interesting every meeting, and that brings a good attendance.

Dayton.

Meets first Saturday of each month at the Y. M. C. A, Dayton, Ohio. Secretary, Alphonz Lamoureux, 432 E. Second St.

At the regular meeting held on November 13, R. Suman demonstrated how much one member can do toward the benefit of the A. E. S., especially to the members fortunate enough to be present on such occasions. First, he put on the screen pictures from slides loaned by the Bureau of Standards, showing the nature of various deposits from still, agitated and mechanical plate solutions. This was very interesting.

Mr. Suman next brought out a small glass tank in which he put some cadmium solution. Placing this in the stereopticon machine, it showed on the screen the working condition and gases evolved. This feature proved a surprise to the boys. It was a novel and instructive "stunt."

Next, Mr. Suman exhibited a chart, the result of a series of experiments on the use of hydrochloric acid in nickel solutions, showing that much of this acid may be added before reaching the limit. Owing to the lateness of the hour, this subject was continued to the next meeting.

At the meeting held on December 4, three applications for membership were received and referred to board of managers.

The discussion of Mr. Suman's chart on the use of hydrochloric acid in nickel solutions brought out some good arguments and, as Mr. Suman is still continuing his experiments, it was decided to hold this over for the January meeting, which will be in the form of a "good" dinner. That is a foregone con-

clusion, owing to the capability of the committee—A. Lamoureux. chairman; R. Suman and C. Hisch. This "doings" will be on January 8.

Dayton branch has made a New Year's resolution—to be heard from in the "Monthly Review" more often, and also to round up a large delegation for the Indianapolis convention.

We also wish all branches a happy and prosperous New Year.

Detroit.

Meets first Friday in each month at Cass Technical High School, Platers' Classroom, 2nd Avenue and Beech Street, at 8 p. m. Secretary, E. G. Lovering, 3719 Grand River Avenue, Detroit, Mich.

Regular monthly meeting was held December 3, with President Kutzen presiding. The attendance consisted of the live members of the branch. Our worthy president has an unassuming, modest nature, but has a characteristic way of getting you interested and holding your attention.

After disposing of the regular business, Mr. P. H. Bergin read a paper on "Die Cast Metal in a Mechanical Plating Equipment." "Pat" gracefully accepted the great applause and retired. Then the discussion started. Many were of the belief that a muriatic acid dip was not a good feature in conjunction with the routine as mentioned in Mr. Bergin's paper.

President Kutzen then brought up for general discussion "The Use of Magnesium Sulphate as an additional Agent in a Nickel Bath." Consensus of opinion was that it slowed up the E. M. F. and had no real beneficial properties, although a claim was brought out that it helped to deposit on work with deep crevices.

Mr. Frank Shepherd, who journeyed down from Flint, spoke on "The Advantages of Chlorides and Flourides in a Nickel Solution with high per cent Nickel Anodes." Mr. Shepherd's talk was well received and "cleverly arranged." Our old war horse, Mr. Tompkins, was back with us for the meeting, after a long trip through the eastern states, and talked on what he saw in the plating world during his travels. He remarked that none of the plants have anything on Detroit, and that it feels good to get back to the land of magic fluid.

Insulating joints and iron hooks were discussed; also what causes a current to flow through an iron tank used in cyanide copper plating, close to the anode rod, that delivers a negative charge and deposits copper on the side of the tank when work is hung on cathode rod. Mr. Phillips explained this by a drawing on the blackboard of tanks wired up in series.

Mr. Wilbur Preston was elected an active member.

Indianapolis.

Indianapolis Branch holds its business meeting the second Saturday in each month at Hotel Denison. Secretary, Louis Mertz, 1725 Union St., Indianapolis, Ind.

Our branch held its regular meeting December 11, presided over by President Hennessey. The attendance was good. While the branch has decided not to take any decisive action on convention work until after the holidays, some plans are beginning to come forth.

Milwaukee.

Meets first Friday of each month at West Side Bank Building. Secretary, A. W. Ruttan, 1105 Twenty-eighth St., Milwaukee, Wis.

The regular meeting, December 3, was called to order by President H. E. Armour, with 15 members present. Ways and means were thoroughly discussed by which we may increase our membership. We now have 31 members and have set out to make it 40. "Watch our smoke." We received one application, which was referred to the board of managers, and Edward A. Wolff was elected to membership. Our librarian, Daniel Wittig, who is always on the job with the question box, had several questions shot at him, and he sure is there with the goods. The board of managers is working hard and will arrange for a banquet in the near future. Chicago branch and all other members within striking distance, please take notice. We also had a very pleasing report from our vice-president, John Guttman, of Grafton, Wis. It was a nine-pound "boy." Pretty work, John.

We had a visit from Mr. Eckstadt, who gave us a very interesting talk on "Electro Galvanizing."

The result of the referendum vote was as follows: In favor of, 1; against amendment, 25.

New York.

Meets every second and fourth Fridays of each month at the Broadway Central Hotel Parlors, New York, N. Y. Secretary, John Burke, 110 Glen St., Brooklyn, N. Y.

President Sterling presided at the November meetings of the New York branch of the A. E. S. A banquet committee was appointed to make preparations and conduct the twelfth annual banquet to be held at the Adline Club, 200 Fifth Avenue, New York City, February 19, 1921.

The committee consists of Messrs. T. B. Haddow, H. C. Flanigan, William Voss, J. Burke, William Fischer and J. Haas. An invitation is extended to the fair sex to attend the coming banquet.

Discussions on the following subjects were indulged in:

The feasibility of the addition of platinum or gold to a silver solution to prevent tarnishing of silver deposit and the durability of Prof. Madsen's nickel deposit if applied to commercial nickel plating.

Pittsburgh.

Meets every first Saturday at 8 p. m. at United States Bureau of Mines Building, Forbes St. Secretary S. E. Hedden, 227 5th St., Aspinwall, Pa.

The attendance at our meeting held Saturday, December 4, was not as good as usual, as it rained all day and all night, but those who ventured out were very glad that they came. It was decided to ask the editor of the Monthly Review to reserve the month of May, 1921, for the "Pittsburgh Number." Pittsburgh branch expects to surprise the editor with enough material for the whole issue and then some. Owing to our next regular meeting falling on New Year's night, it was decided to hold the meeting on the following Saturday night, January 8, 1921.

Discussion on oxidizing solutions took up the evening. A report will be made later, as those who took part were requested to write a little article regarding their views and also what material and quantity used.

Reading.

Secretary, Chas. H. Bingaman, 127 Greenwich St., Reading, Pa.

Reading branch held a meeting on November 27. Mr. Howard Shunk reported that he had a conference with Director Gehris, of the public schools, in reference to the object of the A. E. S. Mr. Gehris promised to submit the question of co-operation to the school board at its next meeting.

Rochester.

Meets on the fourth Fridays. Secretary, Sylvester Gartland, 128 Bryan Street, Rochester, N. Y.

Regular meeting of Rochester branch was held December 10 at the Hotel Seneca, with President Lopez presiding.

A communication was received from Mr. C. O. Fields requesting a transfer to the Newark branch. The request was granted.

The president announced that on the evening of January 14, Mr. J. J. Desmond, chemist at the Northeast Electric Company, will read a paper on analyzing plating solutions, followed by practical demonstration.

Notices will be sent out to all the members of Rochester branch, and it is the desire of the officers to have a large attendance.

St. Louis.

Meets third Saturday of each month at Barr Branch Library, corner Jefferson and Lafayette. Secretary, H. H. Williams, 4156 *Botanical Ave., St. Louis, Mo.*

Regular meeting held on December 18, with a good attendance. Our president, C. L. Weygandt, has returned from California and was on the job. The coming banquet was the important business topic and E. J. Musick reported the progress and assured a real time.

The subject for discussion under the librarian was "Brass Plating," and an excellent paper was read by F. E. Terrio. The discussion was brief, as there is little brass plating done by members of the St. Louis branch.

Our January subject will be "Zinc Plating," with papers by T. F. Carson, F. Horath and T. N. Weber.

Announcement.

The eighth annual banquet will be held at the American Hotel Annex on Saturday, January 22, 1921, at 6:30 p. m. sharp. Addresses by President C. L. Weygandt, H. J. Richards and H. H. Williams; also by Dr. E. Combie Smith, who is a very interesting and instructive speaker. Mrs. Hugo Eckhardt and daughter of Belleville will assist in the musical program. The ladies are invited, so dancing will conclude the program. Employers and friends are invited to attend.

Toledo.

Toledo Branch meets 1*st Thursday night each month at Toledo University Science Building, Electro-Platers' Room, corner Cherry and Page Sts. H. L. Myers,* 410 *Palmer St., Secretary.*

The last regular meeting of Toledo branch was held in the laboratory of Toledo University on December 2. It was decided

to hold our meetings on the first Thursday of each month hereafter. A lively discussion on the merits of various cleaners as compared to the old-fashioned rock potash, with the majority seemingly in favor of potash, was the main topic of the evening. Mr. Nagle asked if anyone present could tell him of a method of removing the black oxide from Brittinia metal ware, previous to replating, by means of a dip or chemical solution. As no one seemed able to answer this question, it was decided to pass it on to the membership at large through the medium of The Review.

APPLICATIONS FOR MEMBERSHIP

Toronto.

Robt. Stokes (active)....439 Barton St., East Hamilton, Ont.
Chas. S. McCully (active).Riordan Plating Co., Hamilton, Ont.
J. Young (active).....13 Brunswick St., Brantford, Ont.
Harry Ives (active).....390 William St., London, Ont.
Geo. Young (active).....Stratford, Ont.
Frank H. Thiers (associate), care of Coleman Lamp Co.....
.....Queen and Davies St., Toronto, Ont.

Boston.

Edward J. White.....33 Cornwall St., Jamaica Plains, Mass.

Bridgeport.

John H. Morsehead.....

Cleveland.

Chas. A. Moore.....1059 7th St. N. W., Canton, O.

Chicago.

Fred Burr.....Crown Electric Mfg. Co., St. Charles, Ill.
John T. Harris.....1204 Washington Blvd., Chicago, Ill.

Cincinnati.

Chas. M. Kelly.....226 E. 11th St., Covington, Ky.

Dayton.

Clarence Wregg (active)..2012 S. Limestone St., Springfield, O.
Geo. W. Speakman (active).320 N. Cleremont St., Springfield, O.
J. Andrews (active).....R. R. 1, New Carlisle, O.

All Electro-Platers, Employers of Electro-Platers
and All Who Have Any Interest in the Art of Protective and
Ornamental Finishes by Process of Electro-Plating
Are Given a Very Cordial Invitation to Attend

The Ninth Annual Banquet

of Chicago Branch

OF THE

American Electro Platers Society

TO BE HELD AT

University Club

Monroe & Michigan Ave.
Chicago, Ill.

7:30 P. M., Saturday, January 29, 1921

The committee of Chicago branch has in the past maintained a very high standard in all features of its annual event.

The occasion this time will serve to bring out some very interesting papers, and all electro-platers and others should take advantage of this opportunity to attend.

For further information, address Mr. F. J. Hanlon, Secretary, 2855 North Richmond St., Chicago, Illinois.